Appendix III

The Commonwealth of Massachusetts
Executive Office of Health and Human Services
Department of Public Health
Bureau of Environmental Health Assessment
250 Washington Street, Boston, MA 02108-4619

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COMMISSIONER

May 10, 2002

Steven Stathis R. S., Director of Environmental Health,
Springfield, Department of Health and Human Services
95 State Street
Springfield, MA 01103

Dear Mr. Stathis:

In cooperation with the American Lung Association of Western Massachusetts, an indoor air quality assessment was done at the Homer Elementary School, Homer Street, Springfield, Massachusetts. This assessment was conducted by the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health Assessment (BEHA). On April 12, 2002, a visit was made to this building by Michael Feeney, Chief of Emergency Response/Indoor Air Quality (ER/IAQ) to conduct the assessment. Mr. Feeney was accompanied by Judy Dean of the American Lung Association of Western Massachusetts during the assessment.

During the course of the assessment, a chemical-like odor was detected on the second floor of the 1920/1925 wing of the school. After conducting testing for carbon dioxide, temperature and relative humidity on the first and second floors, BEHA staff examined the basement level of the building of the 1920/1925 wing, which includes a cafeteria and kitchen. The kitchen contains two natural gas fueled ovens (see Picture 1). The process of combustion related to operation of such equipment produces airborne liquids, solids and gases (NFPA, 1997a). According to the Massachusetts Building Code, "[s]tationary local sources producing airborne particulates, heat, odors, fumes, spray, vapors, smoke or gases in such quantity as to be irritating or injurious to health shall be provided with an exhaust system or means of collection and removal of contaminants" (SBBRS, 1997; BOCA, 1993). These ovens have vents that terminate approximately three feet above the ovens (see Picture 2). This configuration allows for products of combustion from burning natural gas as well as products produced from heating/cooking food to enter into the kitchen. Each oven uses a pilot light to ignite its burners. Air measurements taken above the vent pipe opening with only pilot lights ignited produce a concentration of carbon monoxide of 2 parts per million (ppm). While this amount is not significant from a

health standpoint, the presence of carbon monoxide and other products of combustion and cooking by-products would be expected to increase significantly in the indoor environment once the ovens are operated at full capacity. Adjacent to the kitchen is a room used for storage by kitchen staff. This room is an air mixing room for the original gravity ventilation system (see Picture 3). It is connected by an airshaft to a fresh air diffuser to each classroom (see Picture 4). As the oven produces products of combustion, heated air enters the open door to rise up the airshafts and enter the classrooms. The chemical-like odor detected on the second floor is likely to be from products of combustion accumulating in classrooms and the hallway. The odor detected during the initial entry into the 1920/1925 second floor hallway had dissipated once cooking for the day ceased, indicating that the most likely source of the odor was not from a source within the second floor classrooms but the kitchen ovens themselves.

The configuration of exhaust ventilation for these stoves does not provide adequate exhaust ventilation for cooking by-products if deactivated. The duct that connects the oven hood to the exhaust motor ***slopes downward*** creating a dip at the fan motor (see Picture 5). Vent and chimneys for ovens and stoves should be designed to minimize grease accumulation (NFPA, 1997b). Ducts should not have "…dips or traps, unless automatic grease removers are employed at the dip and traps" (NFPA, 1997b). The duct should lead outdoors to a riser that ejects cooking byproducts from the vent above the roofline.

The process of combustion produces a number of pollutants, depending on the composition of the material. In general, common combustion emissions can include carbon monoxide, carbon dioxide, water vapor and smoke. Of these materials carbon monoxide can produce immediate, acute health effects upon exposure. The MDPH established a corrective action level concerning carbon monoxide in ice skating rinks that use fossil-fueled ice resurfacing equipment. If an operator of an indoor ice rink measures a carbon monoxide level over 30 ppm taken 20 minutes after resurfacing within the rink, that operator must take actions to reduce carbon monoxide levels (MDPH, 1995).

The US Environmental Protection Agency has established National Ambient Air Quality Standards (NAAQS) for exposure to carbon monoxide in outdoor air. Carbon monoxide levels in outdoor air must be maintained below 9 ppm over a twenty-four hour period in order to meet this standard (BOCA, 1993). These NAAQS are used by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) as measures for assessing indoor air quality in buildings (ASHRAE, 1989). No carbon monoxide levels measured at the school exceeded the MDPH ice rink correction levels or NAAQS.

The results of indoor air quality tests, visual observations, and odors detected in occupied spaces all suggest that emissions from the ovens in the kitchen are the most likely source of odors in the second floor of the 1920/1925 hallway.

The most effective methods to remove pollutants from the kitchen that meet current standards would be to install an exhaust duct up the side of the building topped by a mechanical exhaust fan in conformance with design guidelines set forth by the National Fire Prevention Association (NFPA, 1994). The height of the chimney should be sufficient to eject kitchen pollutants above the roof to prevent reentrainment by the building's existing, abandoned ventilation system.

These steps should be considered to limit the infiltration of kitchen generated pollutants into occupied areas of the Homer Street School. A full report of the BEHA reassessment for this building will follow the issuance of this letter. Please feel free to contact us at (617) 624-5757 if you have any questions or need further information.

Sincerely,

Suzanne K. Condon, Assistant Commissioner
Bureau of Environmental Health Assessment

cc/ Michael Feeney, Chief, Emergency Response/Indoor Air Quality, BEHA
District Chief Daniel Laux, Springfield Fire Department, Fire Prevention
Joseph P. Burke, District Superintendent, Springfield School Department
Bobbie Rennix, Principal, Homer Street Elementary School
The Honorable Michael J, Albano, Mayor, City of Springfield
Judy Dean, American Lung Association of Western Massachusetts

Methods

Air tests for carbon monoxide were taken with the TSI, Q-Trak ™, IAQ Monitor Model 8550/8551.

References

ASHRAE. 1989. Mechanical Ventilation Standard. American Society for Heating, Refrigeration and Air-Conditioning Engineers, Atlanta, GA. ANSI/ASHRAE 62-1989.

BOCA. 1993. Building Officials and Code Administrators. The BOCA National Mechanical Code/1993. BMNC-93. Section M-1605.1.

MDPH. 1997. Requirements to Maintain Air Quality in Indoor Skating Rinks (State Sanitary Code, Chapter XI). 105 CMR 675.000. Massachusetts Department of Public Health, Boston, MA.

NFPA. 1994. Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations. 1994 Edition. National Fire Protection Association, Quincy, MA. NFPA 96.

NFPA. 1997a. Chapter 19 Air-Moving Equipment. *Fire Protection Handbook. 18th ed*. Cote, A.E., ed. National Fire Protection Association, Quincy, MA.

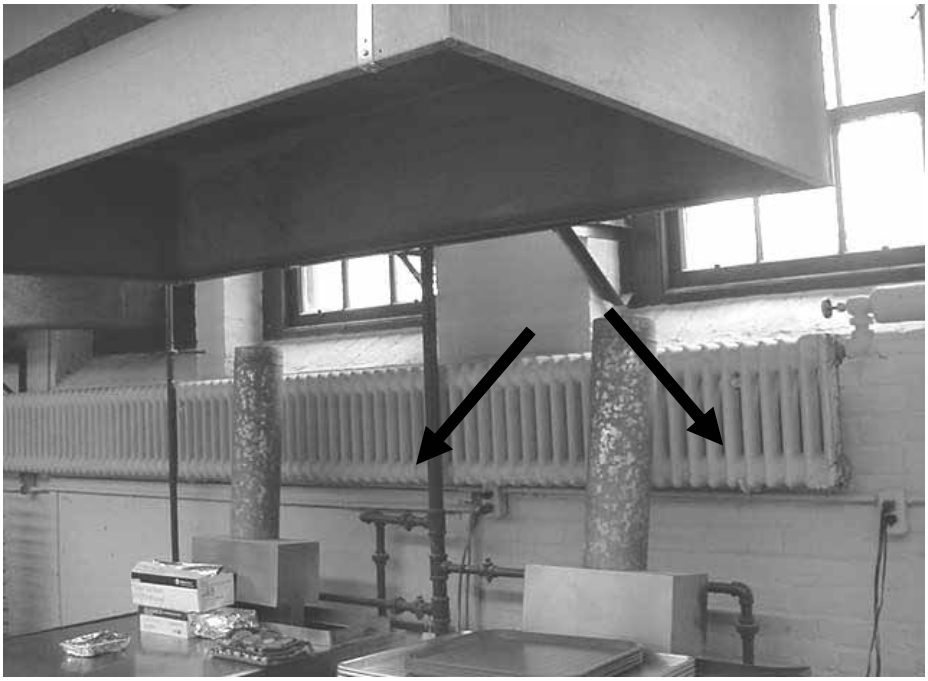
NFPA. 1997b. Chapter 2 Combustion Products and Their Effects on Life Safety. *Fire Protection Handbook. 18th ed.* Cote, A.E., ed. National Fire Protection Association, Quincy, MA.

SBBRS. 1997. Massachusetts State Building Code. Boston, MA: Massachusetts State Board of Building Regulations and Standards. Mechanical Ventilation. 780 CMR 1909.1

Picture 1

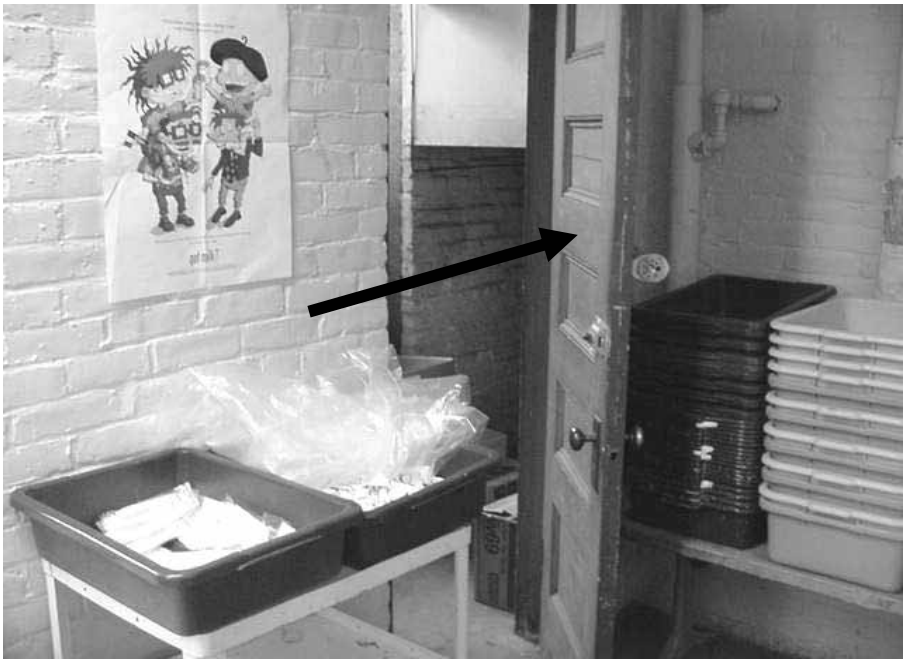
Two Natural Gas Fueled Ovens

Picture 2



Exhaust Vents for Ovens

Picture 3

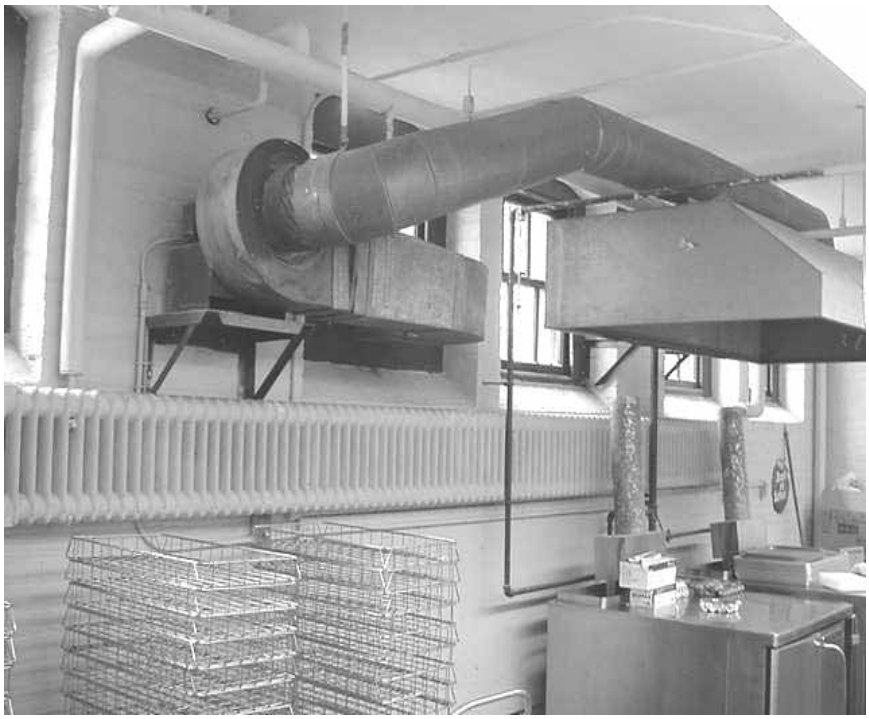


Air Mixing Room Adjacent to Kitchen

Picture 4

Fresh Air Diffuser in Classroom

Picture 5



The Duct That Connects the Oven Hood to the Exhaust Motor *Slopes Downward,* Creating A Dip at the Fan Motor